

Notes on the Physical Appearance of Jupiter etc.

^{1877.}
June 30, 8^h.

Looked at *Jupiter*. A black circular indentation on the edge of the bright belt, darker than the adjacent dark belt. The bright equatorial belt is much broken up, and the two dark belts, especially the southern one, are marked by well defined bright streaks. The planet, however, was not very well defined.—T.

July 2, 8^h—9^h. The equatorial bright belt appeared less dense and narrower than as seen on June 30, as though breaking up, especially near the meridian, where it was encroached upon by the dark belt to the south. The long narrow bright streak of cloud noticed on the 30th on the south dark band still visible, and certainly broader and better defined, extending from the east limb about three-quarters across the planet, tapering towards the west and having its base resting on the east edge of planet, where it merged into the bright equatorial belt. Several remarkable darkish spots on the dark belts were visible, one near the western limb being the most marked; it was situated on the southern verge of the southern dark belt, and immediately to the east of it the adjoining southerly bright belt rose as a sharp bluff, like a cumulus cloud, as shown in the drawing; on the east side of the axis in the same belt, and to the south of the narrow bright streak before mentioned, was another dark spot; on the dark belt north of the equator, and to the east of the meridian, were several other darkish spots, of which the eastern one was the largest, and this at times appeared to extend partly across the equatorial bright belt, giving one the idea, as it appeared and disappeared (owing probably to the variable definition or distinctness of the planet), of a flitting shadow, having apparently a pulsatory movement across the equatorial belt. The dark belts do not appear to me to be so bright or to have the same metallic lustre as last year, being of a burnt-sienna colour and hazy. The drawing taken to-night is about 9½ Jovian days after that taken on June 28.—T.

July 5, 9^h. Planet and satellites well defined; with powers of 300 and 600 both Mr. Ringwood and myself felt certain we saw a spot or mark near the centre of the third satellite.—T.

August 2, 8^h 10^m. The definition good, but the planet had the appearance as if it was covered with a haze or fog; the clouds are not so brilliantly white, and the brown belts not so bright and lack the metallic lustre of last year. In the sketch (which is taken about 75 Jovian days after that of the 2nd July) there is shown a dark copper-coloured streak along the southern margin of the south brown belt, butting on to a bluff-headed streak of cumulus cloud which may be the same remarkable bluff head noticed on July 2. The north brown belt has a few scattered clouds in front of the shadow of the first satellite, as shown in the drawing. At 8^h 15^m it was noticed for the first time that there was a *faint* streak of cloud along the centre of the south dark band—perhaps the remnant of the narrow streak so prominent on July 2.—T. and R.

Oct. 23, 9^h 25^m. At the occultation reappearance of the third satellite, when first seen, it was sensibly separated from the limb or edge of planet, which, however, was not very well defined.—T.

Total Eclipse of the Moon, February 27, 1877.

(Observer, Mr. Todd.)

Phase.	Adelaide Mean Time.			Corresponding Greenwich Mean Time.		
	h	m	s	h	m	s
Shadow first seen	14	44	17.0	5	29	56.0
„ bisecting Latronne	14	52	37.0	5	38	16.0
„ on east side of Tobias Mayer	14	55	57.0	5	41	36.0
„ bisecting Tobias Mayer	14	57	17.0	5	42	56.0
„ on west side of Tobias Mayer	14	57	26.0	5	43	5.0
„ bisecting Copernicus	15	3	25.0	5	49	4.0
„ touching east wall of Tycho	15	3	35.0	5	49	14.0
„ just over Copernicus	15	4	2.0	5	49	41.0
„ bisecting Tycho	15	4	17.0	5	49	56.0
„ bisecting Eratosthenes	15	10	52.0	5	56	31.0
„ on east wall of Archimedes	15	14	35.0	6	0	14.0
„ bisecting Archimedes	15	14	55.0	6	0	34.0
„ on west wall of Archimedes	15	15	20.0	6	0	59.0
„ on east wall of Manilius	15	17	19.0	6	2	58.0
„ bisecting Manilius	15	17	37.0	6	3	16.0
„ on west wall of Manilius	15	17	51.0	6	3	30.0
„ on east wall of Plato	15	18	2.0	6	3	41.0
„ bisecting Plato	15	18	35.0	6	4	14.0
„ on west wall of Plato	15	19	30.0	6	5	9.0
„ on east wall of Menelaus	15	20	24.0	6	6	3.0
„ bisecting Menelaus	15	20	50.0	6	6	29.0
„ on west wall of Menelaus	15	20	59.0	6	6	38.0
„ on east wall of Posidonius	15	27	32.0	6	13	11.0
„ on west wall of Posidonius	15	29	17.0	6	14	56.0
„ on east wall of Proclus	15	33	10.0	6	18	49.0
„ bisecting Proclus	15	33	35.0	6	19	14.0
„ on west wall of Proclus	15	33	53.0	6	19	32.0
„ on eastern edge of Mare Crisium	15	34	37.0	6	20	16.0
„ on western edge of Mare Crisium	15	38	57.0	6	24	36.0
Commencement of totality	15	42	4.8	6	27	43.5
About centre of totality	16	30	22.0	7	16	1.0
End of totality	17	18	13.6	8	3	52.3
East of shadow touching Damoiseau	17	18	42.0	8	4	21.0

Notes.

At 6^h 18^m G.M.T. the eastern limb was of a red coppery colour, which extended as far in as *Tycho* and *Copernicus*, where it gradually shaded off and changed to a deep greenish blue. At 6^h 22^m *Tobias Mayer* was very bright, and I could see all the diverging rays of *Tycho* as well as its prominent features and details. When totality commenced the red copper colour stretched right across the seas; about 7^h 0^m the outer red became more of an orange red, and the plains or seas appeared of a dark or black colour by contrast, the south pole having an orange, coppery, or rosy hue, whilst the north pole was still of a pale bluish green. At about centre of totality the south-east portion of the Moon was of a smoky orange red, extending over the whole of the Moon, leaving a fine yellow crescent round the north-west quarter, after which in the south-east portion the red became lighter and of a paler tint. At 7^h 30^m the yellow crescent was round the north pole, extending from west to east, the south-east portion becoming sensibly brighter; at 7^h 33^m the red colour was all round the south quadrant, more particularly about *Tycho*; at 7^h 38^m the north, east, and east-south-east limbs were of a light yellow colour, the western limb being very faint, and at 7^h 48^m was undiscernible.

General Description.

The total Eclipse of the Moon was observed here under most favourable circumstances. The sky was brilliantly clear, and the aspect of the heavens beautiful in the extreme.

The smoky reddish colour usually seen at lunar eclipses was well marked, but those portions of the Moon which passed through or near to the centre of the shadow were very dark, especially the plains or so-called seas, which appeared nearly black. The red colour was not very apparent until the shadow covered a considerable area of the surface, when all between and about the region of *Tycho* and *Copernicus* (over which the shadow passed almost simultaneously) was of a deep smoky red—brighter near *Copernicus*; whilst towards the advancing margin of the shadow, but within it, was of a greenish blue and yellow. The centre of the Moon passed through the northern portion of the shadow, and shortly before the eastern limb emerged, the western limb and round about *Mare Crisium* was near the axis or centre of the shadow and became nearly invisible; the eastern limb as it approached the edge of the shadow assuming the greenish yellow tinge of dawn, the north pole being similarly coloured, but separated by a dark gap from the illumination round the eastern and south-eastern limb, and the western limb becoming almost invisible, a horseshoe gulf of blackness extending inwards nearly half across the Moon.

Towards the end of totality, when the western limb was in the centre of the shadow, it became, as already stated, nearly invisible; I could not see it with a binocular fieldglass, and with the large telescope only by using a low power, the outline being then barely visible and the surface of *Mare Crisium* quite shut out. It may be remarked that at the time of central eclipse there was a sea horizon nearly all round, the Moon being in the zenith of a place on the Earth, the position of which is 74° 26' E. long.

and $8^{\circ} 13'$ N. lat.; the Atlantic Ocean immediately west of Africa therefore formed the horizon or bounding surface on the west and the Pacific Ocean immediately east of Australia on the east. It is not therefore improbable that the conditions for illumination were favourable; as a matter of fact, with the exception of the obscuration of the western limb and the darkness of the large plains when near the centre of the shadow, all the prominent features of the Moon were distinctly visible, especially the bright mountain *Aristarchus*, and even the diverging rays from *Tycho* and *Copernicus* could generally be seen.

During the Eclipse a number of Occultations of neighbouring small stars occurred. One only was noted, viz. a star of about the 10th magnitude, which disappeared at the north-east limb, at $16^h 47^m 3^{s.7}$ A.M.T., corresponding to $7^h 32^m 42^{s.4}$ G.M.T., appearing to hang on the dark edge of the limb, which was sharply defined, for two or three seconds.

Partial Eclipse of the Sun, February 2, 1878.

(Observer, Mr. Ringwood.)

The commencement of the Eclipse was well observed here with the 8-inch Equatoreal; the first surface reflection eye-piece, with a power of 67, was used. The first contact was noted at February 2, $5^h 42^m 35^{s.0}$ Adelaide mean time, corresponding to February 1, $20^h 28^m 13^{s.7}$ Greenwich mean time, and may be a second or two late. No spots were visible with power 120; the Moon appeared very black by contrast, but, when the Sun was out of the field of view, it was palely illuminated by Earth-light, no lunar features being, however, discernible; weather fine, passing clouds.

Observations of the solar thermometer were not taken, on account of the passing clouds, but the shade temperature was continually watched, nothing of importance being recorded.

Transit of Mercury, May 6, 1878.

(Observer, Mr. Ringwood.)

The Egress was observed here under very favourable conditions, the definition being very fair considering the low altitude of the Sun; the 8-inch Equatoreal, with the double micrometer eye-piece and a power of 140, was used. The Adelaide mean time of internal contact at egress was noted as May 6, $19^h 59^m 32^{s.1}$ and the external contact as $20^h 2^m 36^{s.5}$, corresponding respectively to May 6, $10^h 45^m 10^{s.8}$ and $10^h 48^m 15^{s.2}$ Greenwich mean time; the egress took place at about $101^{\circ} 42'$ west of the north pole of the Sun.

When the planet was very close to the Sun's limb, which was